

RADIO NETWORK FOR PROTECTING ELECTRONIC DEVICES FROM ELECTROMAGNETIC RADIATION OF A MOBILE STATION

TECHNICAL FIELD

[0001] This application relates to a protective device and a method for protecting a second device from the electromagnetic radiation of a first device, particularly for use in hospitals.

BACKGROUND

[0002] Wireless communications networks, and especially radio networks known by the name Wireless Local Area Network (WLAN) (), are often used in buildings.

[0003] Restrictions in the use of such radio networks often arise because of other devices that are sensitive to electromagnetic radiation, especially in hospitals. In areas where devices, such as respirators, which might be affected by electromagnetic radiation are located, radio networks are therefore typically not used.

[0004] A protective device and method are known, for instance, from US Patent 6,343,213 B1

[0005] From US Patent disclosure 2003/0114104A1, to assure safe wireless communication between a central access point and a mobile device via a BLUETOOTH interface, ascertaining the difference between the access point and the mobile device with the aid of a Radio Frequency Identification (RFID) system is provided. Only within a range from the access point that is determined via the RFID is communication permitted.

[0006] A system for converting the operating mode of mobile radio devices in threatened areas, such as hospitals, is for instance known from US Patent 6,343,213 B1. In this case a base station can send a signal to the portable radio device that causes a switchover to lower power or a shutoff of the portable radio device.

[0007] A further system for protecting a defined area against effects from portable radio devices is known from European Patent Disclosure EP 1 035 746 A1. In this system, protective devices are provided that operate independently of the telecommunications system, and in particular with different radio frequencies.

SUMMARY

[0008] A radio network and a method for operating a radio network are described. A first device is a device of the radio network that has a transmitter, while a second device is a device that is to be protected against the electromagnetic radiation of the transmitter. One of the two devices has a wireless interrogation system or transceiver, which cooperates with a reflecting device, in particular a transponder, associated with the other device.

[0009] The interrogation system, together with the reflecting device, forms a contactless detection system, which furnishes the first and/or second device with at least approximate information about the distance between the two devices. The device in the radio network that has the transmitter may also be equipped with the interrogation system, while the second device that is sensitive to the electromagnetic radiation of the radio network has the reflecting device, which may be a transponder. In this configuration, the electromagnetic field impinging on the second device, which is threatened by electromagnetic radiation, for example, a medical device, can be monitored and controlled.

[0010] Depending on the type and size of the first and second devices, among other factors, the second device, to

be protected against the electromagnetic radiation of the radio network, may also have a transceiver unit of a contactless interrogation system, while the first device, forming part of the radio network, has a corresponding reflecting device.

[0011] Depending on the distance between the devices, measured by means of the contactless proximity measuring system, a switchover may be made between two different operating modes: a normal operating mode and a special operating mode. The latter mode is intended for shorter distances of separation between the devices which is associated with higher electromagnetic field strength. In addition to the physical spacing between the devices, the electromagnetic field strength may be affected by radiation-absorbing or -reflecting elements. What is determinative for the switchover between the various operating modes is the degree of attenuation of the transmitted electromagnetic radiation, at the location of the second device and thus the electromagnetic field strength.

[0012] In a first aspect, the transmit power of the transmitter of the first device is set differently in the various operating modes. The transmit power can be reduced in stages or continuously. In the event of impermissibly high electromagnetic field intensities in the area of the second device, the transmitter may be automatically

switched off. A threat to the second device from the transmission unit of the contactless interrogation system, conversely, need not as a rule be assumed.

[0013] Accordingly, both in embodiments in which the interrogation system may be associated with the first device, and in embodiments in which the first device includes only the reflecting device, the interrogation system is typically operated at constant operating parameters, and in particular a constant transmit power. A threat to the second device from the transmission unit of the contactless interrogation system, is generally not encountered. However, if a threat to the second device by the electromagnetic radiation transmitted in the operation of the interrogation system cannot be precluded, it is also possible to vary the operating parameters of the interrogation system, such as the transmit power, as a function of the measured distance or the electromagnetic field strength measured between the two devices.

[0014] In another aspect, the outputting of a warning report by one of the devices as a function of the operating mode may be provided. Independently of, or in addition to, a generated warning report, automatic shutoff of the second device that is to be protected may be provided. The device that is threatened by the electromagnetic radiation may automatically adapt operation to the threat. In yet another aspect, if an approach

between the two devices is detected by the contactless proximity measuring system, a switchover of the operating mode of both the first, threatening device and the second, threatened device is provided, and stopping the operation may also be included as a special case of an operating mode switchover.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] An example is described in further detail below with reference to the drawings.

[0016] FIG. 1 shows a schematic layout plan of a radio network.

DESCRIPTION

[0017] Reference will now be made in detail to examples, but it will be understood that it is not intended to limit the invention to such examples. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention which, however, may be practiced without some or all of these specific details. In other instances, well known process operations have not been described in detail in order not to unnecessarily obscure the description.

[0018] A radio network 1, installed for instance in a hospital, may include, in addition to a number of fixed stations, not shown, a mobile device 2, which has a transmitter 3. A second device 4, for instance a respirator, which is not part of the radio network 1, is potentially threatened by the electromagnetic radiation, originating at the transmitter 3, of the first device 2, such as a mobile phone or a tablet computer.

[0019] The second device 4 has at least one and may have a plurality of reflecting devices 5, in the form of transponders (TAGs) which are, for instance, glued in the form of labels to the second device 4. Alternative, reflecting devices 5, for instance in the form of small tubes, may be secured to the second device 4. Cooperating with the reflecting devices 5, in a manner known, for instance, from German Patent DE 197 03 823 C1, is an interrogation system 6 of the first device 2, this system including a transceiver unit. The transmitter (not shown), of the interrogation system 6 may not be part of the radio network 1. The electromagnetic radiation originating in the transmitter of the interrogation system 6 is represented symbolically by concentric circles in the drawing and defines a detection range 7, within which the interrogation system 6 can detect the presence of a reflecting device 5. The detection range 7 typically extends over a distance on the order of magnitude of 1 m from the first device 2. The result is a safety zone 8 surrounding the second device 4,

shown drawn in dashed lines. When the first device 2 is moved into the safety zone 8, the first device 2 may automatically switch from a first operating mode, that is, a normal operating mode N2, to a second operating mode, a special operating mode S2.

[0020] The operating parameters of the special operating mode S2 are configurable. When in the safety zone 8, the transmitter 3 of the first device 2, may operate with reduced the transmit power or cease operation partially or completely, in order to preclude a threat to the second device 4. The first device 2, upon being positioned in the safety zone 8, may output a warning report, which may warn against operating the first device 2 in the vicinity of the second device 4, or prompt the removal of the first device 2 from the safety zone 8.

[0021] In another example, the threatened second device 4 can also have the interrogation system 6, while the first device 2 that includes the transmitter 3 has at least one reflecting device (TAG) 5. The second device 4, which reads out the interrogation system 6, can output a warning report upon the approach of the first device 2. The operation of the second device 4 may also be stopped in response to the threat from the electromagnetic radiation originating in the first device 2, by means of a switchover from a normal operating mode N4 to a special operating mode S4, for instance an emergency operation program. The

provision of a reflecting device 5 on the first device 2 furthermore has an advantage that permanently equipping the first device 2 with a wireless interrogation system may be unnecessary; instead, as needed, for instance solely while in a threatened area such as a hospital, the reflecting device 5 can be secured to the first device 2, by, for instance being glued or clipped the first device.

[0022] Although the present invention has been explained by way of the examples described above, it should be understood to the ordinary skilled person in the art that the invention is not limited to the examples, but rather that various changes or modifications thereof are possible without departing from the spirit of the invention. Accordingly, the scope of the invention shall be determined only by the appended claims and their equivalents.